

REMARKS

Status of Claims

Claims 1 – 28 were original in the application. Claims 1 – 28 have been currently amended. Claims 1 – 28 are submitted for examination on the merits.

Objection to Drawings

Figure 2 is objected to for a typographical error. By way of this reply, Fig. 2 has been amended to correct the error, *i.e.*, one of the “ m_1 ” is replaced with “ m_2 .” No new matter has been added by way of this amendment as support for this amendment may be found, for example, in the informal drawings as originally filed.

Figures 7B and 8B are objected to for using symbols “ f_{11} ” and “ f_{22} ” that are not described in the description. By way of this reply, the symbols have been replaced with “ ω_{1x} ” and “ ω_{2x} ,” respectively. No new matter has been added by way of these amendments as support for these amendments may be found, for example, in the “Brief Description of the Drawings” of the application as filed. In addition, Applicant respectfully notes that, like “ ω ,” “ f ” is commonly used to represent “frequency” and is usually interchangeable with “ ω .”

Further, the Examiner asserts that the “first, second and third flexures are not all numbered.” This objection is respectfully traversed. Flexures 28a, 28b, 28c, and 28d have been clearly shown in, *e.g.*, Fig. 4. Their respective relation to the first, second and third flexures have been clearly described in, *e.g.*, paragraph [0071] of the published application (Pub. No. 20050199061). Furthermore, Applicant respectfully

notes that there is no requirement for elements in claims to be exactly corresponding to similar numeral references in the specification.

Accordingly, withdrawal of the objection to the drawings is respectfully requested.

Objection to Claims

The Examiner asserts that claim 3 is objectionable because the “drive-mode oscillator is defined as the three interconnected masses driven into oscillation by electrodes,” thus it does not “drive the three interconnected masses.” This is respectfully traversed because, as Applicant has acted as his or her own lexicographer, the meanings of the claim language have been clearly supported by the specification. Thus, based on the specification, those of ordinary skill in the art will be able to understand the descriptions such as the oscillator driving the three masses, and the sense mode oscillator sensing the motion. However, to help advance the prosecution of the application, claim 3 has been amended responsively, rendering the objection moot.

The Examiner further objects to the description of the third mass comprising a vibration absorber in claim 3, as the Examiner asserts that “the third mass is the vibration absorber.” This objection is respectfully traversed because, even if the third mass is the vibration absorber, there is nothing prohibiting saying that the third mass “comprises” the vibration absorber. However, to help advance the prosecution of the application, claim 5 has been amended responsively, rendering the objection moot.

Claim 6 is objected to because “a substrate” is repeated. Claim 6 has been amended responsively, rendering the objection moot.

Claim 12 is objected to because “the third mass is a component of the sense-

mode oscillator, and not a separate element.” This objection is respectfully traversed because, even if the third mass is part of the sense-mode oscillator, there is nothing wrong saying that the third mass absorbs vibrations of the sense mode oscillator. However, to help advance the prosecution of the application, claim 12 has been amended responsively, rendering the objection moot.

Claim 14 is objected to for minor informalities. By way of this reply, claim 14 has been amended responsively, rendering the objection moot.

Claim 15 is objected to as it is unclear to the Examiner whether the “second motion” is a limitation of the sense-mode oscillator or it is a standalone expression. By way of this reply, claim 15 has been amended responsively, rendering the objection moot.

Claim 18 is objected to as the Examiner asserts that “the same drive motions are repeated several times in different language as different steps.” This is respectfully traversed. The word “drive” is used in claim 18 in different contexts, *e.g.*, it is used as a verb in some of the contexts, and is also used as a noun to limit “direction.” The occurrence of the same word “drive” does *not* indicate that it is the same “drive motion.”

Claim 19 is objected to for grammatical errors. Although Applicant disagrees for reasons similar to those discussed above, claim 19 has been amended responsively, rendering the objection moot.

Claim 20 is objected to because “the three interconnected masses” lacks antecedent basis. The base claim 15, from which claim 20 depends, has been amended, rendering the objection moot.

Claims 26 and 28 have been amended responsively, rendering the objections

moot.

Accordingly, withdrawal of the objection to all the claims is respectfully requested.

Rejection Pursuant to 35 USC 112, First Paragraph

Claims 3, 4 - 7, 10 - 13, 21 and 24 - 25 are rejected as failing to comply with the written description requirement. For at least the following reasons, the rejection is respectfully traversed.

Claim 3 is rejected as the Examiner asserts that “only one mass is sensed in the sense-mode oscillator, according to the specification.” This is respectfully traversed because, contrary to the Examiner’s assertions, claim 3 does not recite a mass being “sensed.” Further, as clearly described in the specification and recited in the claims, the sense-mode oscillator comprises more than one mass. Furthermore, claim 3 has been amended by way of this reply for further clarification purposes, rendering the rejection moot.

Claim 4 is rejected as the Examiner asserts that “the specification does not describe the first mass as a passive mass.” However, claim 4 does not recite “the first mass as a passive mass.” Thus, the rejection is based on misreading the claim. Accordingly, the rejection is improper and must be withdrawn. Further, it is respectfully submitted that the Examiner has further misread claim 4 and has incorrectly stated that the “drive means” and the “sense means” are not disclosed. These concepts are clearly described, e.g., in paragraph [0012] of the published application.

Claim 6 is rejected as the Examiner asserts that “the specification does not teach

a sense-mode oscillator that includes drive means for driving a mass in a sense direction, or a drive-mode oscillator having a sense means.” This rejection, like the rejection of claim 4, is also improper and must be withdrawn. These limitations are clearly disclosed in, e.g., paragraph [0012] of the published application. In addition, Applicant respectfully notes that it is not necessary for the phrase “means” to appear in the detailed description to describe a device or a component as “means.”

Claim 7 is rejected as the Examiner asserts that “the first and third flexures are not disclosed having a resiliency in the same (*i.e.*, first) direction.” This is respectfully traversed because, not only does the specification (*see, e.g.*, paragraph [0015] of the published application) disclose such a feature, the detailed description (*see, e.g.*, paragraph [0049] of the published application) further describes how the motions are constrained (as a result of the resiliency). Even where the exact expression “resiliency” is not used, the physics of “resiliency” has been described.

From the above discussions with respect to the expressions “drive,” “resiliency,” and “means,” it becomes evident to Applicant that the Examiner, likely relying upon a simple “search” tool in a word processing software, has limited his examination of the application to simply looking up “key” words without putting into context such words and without an understanding of the essence of the claimed invention. The Examiner is respectfully requested to properly consider the conceptual context of the words, “drive”, “resiliency” and “means” in light of the specification as a whole and the drawings.

The rejections of claims 10 and 12 are essentially the same as those of claims 4 and 6, and thus are also improper and must be withdrawn.

Claim 21 is rejected as the Examiner asserts that “the third mass is not disclosed

as being coupled to the second mass by two coupled folded springs.” This rejection is also improper, as the specification not only discloses such features (see, e.g., paragraph [0015] of the published application), but also provides further details (see, e.g., paragraphs [0050] and [0102] of the published application) on the coupling.

The rejection of claim 24 is essentially the same as those of claims 4, 6, 10, and 12. Thus, the rejection of 24 is also improper and must be withdrawn.

Rejection Pursuant to 35 USC 112, Second Paragraph

Claims 1-28 are rejected as being indefinite. By way of this reply, claims 1 - 28 have been responsively amended for clarification purposes. To the extent that the rejection may still apply to the amended claims, the rejection is respectfully traversed.

Regarding claims 1 and 15, the Examiner particularly rejects the claims because of the expression “dynamically mechanically decoupled.” By way of this reply, the expression has been replaced with “mechanically decoupled.” It is respectfully submitted that, an applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s). See *In re Paulsen*, 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994).

The expression “mechanically decoupled” has been clearly defined in, for example, paragraph [0007] of the published application:

In the illustrated embodiment of the invention, we propose a micromachined gyroscope system utilizing dynamical amplification to achieve large oscillation amplitudes without resonance, while mechanically **decoupling the drive direction oscillations from the**

sense direction oscillations.

Further, it is respectfully submitted that in asserting that the drive-mode oscillator and the sense-mode oscillator are not decoupled (see, page 7, paragraph 27 of the Office Action), the Examiner has relied upon over-simplified analysis without referring to the physics of the motions.

For a complex device like that of the claimed invention, to correctly understanding the concept, mathematical tools are required. Referring to, *e.g.*, paragraph [0072] of the published application and the equations relating stiffness to the flexure lengths, the lengths are designed according to optimized stiffness values to achieve the claimed decoupling. The successful decoupling is clearly described by, for example, the equation of motion in the drive direction (*i.e.*, the equation following paragraph [0087] of the published application), *and* the equation of motion of the sense-mode oscillator. Those of ordinary skill in the art, aided with the specification of the present application, will appreciate that the lack of coupling terms in the equations of motion indicate the decoupling between the drive-mode oscillator and the sense-mode oscillator. Such a decoupling is also evident in, *e.g.*, Figs. 3 and 6 - 9 of the present application.

Regarding the rejection due to the term “employ,” the claims have been responsively amended.

Regarding the rejection due to the listing of elements of the gyroscope, the claims have been responsively amended, rendering the rejection moot. In addition, Applicant respectfully notes that there are no patent regulations against reciting elements having mutual subelements.

Regarding the expressions “resonance” and “nonresonant,” the claims have been responsively amended. Further, as discussed earlier, acting as his or her own lexicographer, Applicant has clearly defined the expressions “resonance” and “nonresonant” using not only text, but also the equations and drawings. Without reading such equations and drawings as part of the disclosure, and only relying upon randomly picked and chosen “key” words, the Examiner has not understood the essence of the claimed invention.

Claim 2 has been responsively amended. In particular, the “movement” is limited to that of at least one of the three interconnected masses, and the phrase “large” has been removed.

Regarding claims 11 and 13, as discussed earlier, the expressions “resonant” and “nonresonant” have been clearly defined in the specification. Further, it is respectfully submitted that the Examiner has improperly equated a “resonant frequency” to the gyroscope being resonant. Again, these expressions should *not* be read without reference to their respective contexts.

Claim 16 has been responsively amended similar to claim 2 discussed above.

Claim 25 has been responsively amended with respect to “what is being dynamically amplified.” In addition, Applicant respectfully notes that the Examiner has again improperly applied the phrase “resonant” to limit the whole gyroscope without carefully reading the claim.

Claim 26 clearly recites “mechanically amplifying sense direction oscillation amplitudes.” Thus, the rejection is based on the Examiner’s misreading the claim.

Claim 25 has been responsively amended with respect to “what is amplified.”

The assertion “it is unclear how the gyroscope can be resonant and nonresonant at the same time” is improper as discussed above with respect to other claims.

In view of the above, amended claims 1 - 28 are clearly supported by the written description and are definite. Accordingly, withdrawal of the rejection is respectfully requested.

Rejection Pursuant to 35 USC 102(e)

Claims 1, 15, and 20 stand rejected as being anticipated by U.S. Patent No. 6,691,571 (“Willig”). As noted below, the rejection is improper. Further, the rejection is traversed because for at least the following reasons, Willig fails to disclose or enable the claimed invention as recited in claims 1, 15, and 20.

At the outset, it is unclear to Applicant why the instant Office Action (page 10, lines 1 - 6) discusses the prior art date of the reference being determined under pre-AIPA 35 U.S.C. 102(e). Willig was initially filed on February 21, 2001, which, contrary to the Examiner’s assertion, is clearly after November 29, 2000. Thus, the rejection is improper and should be withdrawn.

To help advance the examination process, Applicant further submits that, for at least the following reasons, Willig fails to show or suggest the claimed invention.

The claimed invention is directed to nonresonant micromachined gyroscopes with structural mode-decoupling. Amended independent claims 1 and 15 each require, in part, that a gyroscope includes a drive-mode oscillator and a sense-mode oscillator, and that the drive-mode oscillator includes a first combination of at least two masses out of three interconnected masses, and the sense-mode oscillator includes a second

combination of at least two masses out of the three interconnected masses. Further, the drive-mode oscillator and the sense-mode oscillator are mechanically decoupled, and the gyroscope operates in a nonresonant mode.

Willig, which is directed to a rotational speed sensor, fails to disclose or enable at least the above-mentioned limitations.

In the instant Office Action (page 10, line 9), the Examiner has interpreted the drive element 102 of Willig as the drive-mode oscillator, and the proof element 140 of Willig as the sense-mode oscillator. However, as clearly shown in Fig. 1 and described in the associated text in Willig, and as admitted in the instant Office Action, both the drive element 102 and the proof element 140 of Willig are *single-mass* elements. By contrast, the drive-mode oscillator and the sense-mode oscillator of the claimed invention each contain *at least two masses*.

In the instant Office Action (page 10, lines 10-11), the Examiner has asserted that the purported drive-mode oscillator and the sense-mode oscillator of Willig employ three interconnected masses 102, 100, and 140. However, this assertion contradicts the interpretation given in page 10, line 9 of the Office Action.

The Examiner has further asserted that the “element 140 is decoupled in the sensing direction from the driving direction,” and that the “oscillator 140 is decoupled from oscillator 102 by connections 142.” It is unclear to Applicant which of these “decouplings” has been equated to the mechanically decoupled drive-mode oscillator and the sense-mode oscillator of the claimed invention. Neither of the purported “decouplings” in Willig is, in fact, is equivalent to the decoupling between the drive-mode oscillator and the sense-mode oscillator of the claimed invention.

The Examiner further asserts in the Office Action (page 11, lines 1-2) that the sensor of Willig “is structurally capable of being operated in a ‘nonresonant’ mode.”

Applicant respectfully disagrees. Willig, in col. 2, lines 41-44 (relied upon by the Examiner), merely discloses:

Coriolis element 100 is connected to drive element 102 via springs 103. Therefore, relative to drive element 102, Coriolis element 100 is essentially only able to move in the Y direction. When drive element 102 moves in a direction in parallel to the X direction.

The above description only discloses the motion *directions*, and there is nothing in Willig showing or suggesting that the sensor is not being operated in resonant mode. Without the designs of the drive and sense anti-resonance *frequencies*, the sensor of Willig is, most likely as other conventional sensors as described in the Background section of the present application, being operated only in resonant mode.

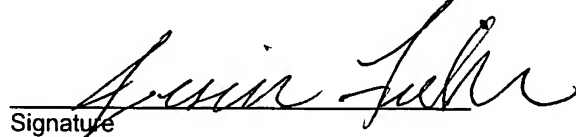
In view of the above, the 102(e) rejection is improper. Further, Willig fails to disclose or enable the claimed invention as recited in amended independent claims 1 and 15 of the present application. Thus, independent claims 1 and 15 are patentable over Willig for at least the reasons set forth above. Dependent claim 20 is allowable for at least the same reasons. Accordingly, withdrawal of the rejection is respectfully requested.

For these, and other, reasons, Applicants believe that the claims are in condition for allowance. Reconsideration, re-examination, and allowance of all claims are respectfully requested.

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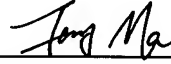
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APPENDIX